NTNU-CSC PhD Scholarship:

Methods for predicting handling and installation response of power cables and flexible pipes

Type of scholarship: PhD scholarship

Period of the scholarship: 01 October 2021 – 30 September 2025

Short description of the scholarship:
Facing the worlds need for cutting greenhouse gases, offshore wind energy has become one of several emerging renewable energies for future. In order to transport the energy to market, subsea power cables represent critical infrastructures. This includes both dynamic cables connecting floating wind turbines to the seabed and on bottom sections of static cables connecting each turbine to the grid. The cable design needs to be optimized both with respect to voltage and cost. Then each cable will be exposed to a set of complex non-linear static and dynamic loads due to the manufacturing, installation and handling operations which may influence the mechanical strength of the as installed component. Meanwhile, the oil and gas industry is moving into deeper waters, challenging the structural strength of flexible pipes specially during the installation phase due to the simultaneous acting external pressure. Both structures are similar with respect to their helical layered structure. The methods applied to predict stresses and fatigue during the operation phase are similar and relative mature for both cases. However, the methods for predicting installation and handling related failure modes are not that well developed due to the complexities related to the layered structure, long lengths and complex load patterns.

The purpose of the present project is therefore to develop models that are able to predict installation and handling failure modes relevant for future cross-section designs of relevance for both power cables and flexible pipes.

The research project will mainly focus on following topics:

- The formulation of a simplified non-linear layered structural models applicable for the analysis of realistic installation scenarios, i.e. long lengths
- The formulation of associated slip function based contact and friction models
- The treatment of the installation and handling load sequence:
- The formulation of localized failure modes in a global framework allowing long length models to be applied

Qualification and requirement:

- The PhD-position's main objective is to qualify for work in research positions. The qualification requirement is completion of a master's degree or second degree (equivalent to 120 credits) with a strong academic background in e.g. Naval Architecture, Ocean Engineering or equivalent backgrounds with a grade of B or better in terms of NTNU's grading scale.
- Preferred selection criteria
  - The candidate should have a background, and practical experience, with at least two of following fields:
    - ✓ Structural mechanics and dynamics
    - ✓ Stochastic methods of structural analysis
    - ✓ Advanced numerical simulation (FEM)
    - ✓ Programming and development of software

In addition, for all applicants the following applies:

- Fluent English language, both written and spoken with certificates of TOEFL minimum 95 or IELTS minimum 6.5
- Chinese citizenship documents (copy of his/her passport or national ID of P.R. China
- CV
- A motivation letter

Deadline for submission of application: 15th Feb 2021

Scholarship: 17000 NOK/month for a period of up to 48 months

According to the NTNU-CSC agreement
CSC will provide a living stipend, currently 12,500 NOK per month for a period of up to forty-eight (48) months, and a round-trip international airfare between China and Norway. NTNU will provide a monthly additional funding for a period of up to forty-eight (48) months, which combined with the CSC living stipend ensures the sufficient income (currently minimum 17,000 NOK per month) required by NTNU. No tuition fees will be charged for PhD candidates at NTNU.

Supervisor info:
Svein Sævik, Professor
Department of Marine Technology, NTNU
svein.savik@ntnu.no
Mobile: +47 92891855

Naiquan Ye, Senior Research Scientist
SINTEF Ocean
Naiquan.Ye@sintef.no

Email and contact information for where to send the application:
Svein Sævik, Professor
svein.savik@ntnu.no
Naiquan Ye, Senior Research Scientist
Naiquan.ye@sintef.no